

THAT WHICH IS CLAIMED IS:

1. A fiber optic connector comprising:

5 a multifiber ferrule having an end face and an opposed rear face, the end face defining a plurality of optical fiber bores opening therethrough for receiving respective optical fibers, the fiber optic connector defining a longitudinal axis that is generally parallel to each of the optical fiber bores; and

10 at least one force centering element for applying a biasing force to the ferrule in the direction of the longitudinal axis without generating a moment about a lateral axis defined by the end face of the ferrule.

15 2. A fiber optic connector according to claim 1 further comprising a spring seat having a forward portion that engages the rear face of the ferrule and a rearward portion opposite the forward portion and wherein the rearward portion comprises the at least one force centering element.

20 3. A fiber optic connector according to claim 2 wherein the at least one force centering element is disposed medially on the rearward portion and comprises a protrusion that extends outwardly from the rearward portion.

4. A fiber optic connector according to claim 3 wherein the protrusion engages a coil spring that exerts the biasing force on the ferrule and wherein the forward portion engages the rear face of the ferrule to transfer the biasing force to the ferrule.

25 5. A fiber optic connector according to claim 1 further comprising a spring seat having a forward portion that engages the rear face of the ferrule and a rearward portion opposite the forward portion and wherein the forward portion comprises the at least one force centering element.

6. A fiber optic connector according to claim 5 wherein the at least one force centering element is disposed medially on the forward portion and comprises a protrusion that extends outwardly from the forward portion.

5 7. A fiber optic connector according to claim 6 wherein the rearward portion engages a coil spring that exerts the biasing force on the ferrule and wherein the protrusion engages the rear face of the ferrule to transfer the biasing force to the ferrule.

10 8. A fiber optic connector according to claim 5 wherein the spring seat comprises an arcuate side wall for engaging an interior surface of a connector housing such that the spring seat is movable only in the direction of the longitudinal axis.

15 9. A fiber optic connector according to claim 1 wherein the end face defines a first lateral axis generally perpendicular to the longitudinal axis and wherein the rear face comprises the at least one force centering element.

20 10. A fiber optic connector according to claim 1 wherein the end face defines a first lateral axis generally perpendicular to the longitudinal axis and a second lateral axis generally perpendicular to the longitudinal axis and to the first lateral axis and wherein the rear face comprises the at least one force centering element.

25 11. A fiber optic connector according to claim 1 wherein the end face defines a first lateral axis generally perpendicular to the longitudinal axis and a second lateral axis generally perpendicular to the longitudinal axis and to the first lateral axis and wherein the rear face comprises the at least one force centering element and defines a first convex surface in the direction of the first lateral axis and a second convex surface in the direction of the second lateral axis.

30 12. A fiber optic connector according to claim 5 wherein the end face defines a first lateral axis generally perpendicular to the longitudinal axis and wherein the forward

portion of the spring seat comprises the at least one force centering element and defines a convex surface in the direction of the first lateral axis.

5 13. A fiber optic connector according to claim 5 wherein the end face defines a first lateral axis generally perpendicular to the longitudinal axis and a second lateral axis generally perpendicular to the longitudinal axis and to the first lateral axis and wherein the forward portion of the spring seat comprises the at least one force centering element and defines a convex surface in the direction of the second lateral axis.

10 14. A fiber optic connector according to claim 1 wherein the end face defines a first lateral axis generally perpendicular to the longitudinal axis and a second lateral axis generally perpendicular to the longitudinal axis and to the first lateral axis and wherein the forward portion of the spring seat comprises the at least one force centering element and defines a first convex surface in the direction of the first lateral axis and a second  
15 convex surface in the direction of the second lateral axis.

15 15. A fiber optic connector according to claim 1 further comprising a spring seat having a forward portion for engaging the rear face of the ferrule and a rearward portion opposite the forward portion and wherein the ferrule comprises at least one first force  
20 centering element disposed on an exterior surface of the ferrule medially between the end face and the rear face.

25 16. A fiber optic connector according to claim 15 wherein the spring seat comprises at least one second force centering element disposed on the rearward portion.

30 17. A fiber optic connector according to claim 16 wherein the spring seat further comprises at least one transfer arm extending outwardly from the forward portion for engaging the at least one first force centering element.

35 18. A fiber optic connector according to claim 16 wherein the at least one second force centering element engages a coil spring that exerts the biasing force on the ferrule

and wherein the transfer arm transfers a portion of the biasing force to the at least one first force centering element.

5 19. A fiber optic connector according to claim 16 wherein the end face defines a first lateral axis perpendicular to the longitudinal axis and a second lateral axis perpendicular to the longitudinal axis and to the first lateral axis and wherein the at least one first force centering element comprises a pair of first force centering elements spaced apart laterally in the direction of the second lateral axis and symmetrical about a plane comprising the second lateral axis and the longitudinal axis.

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20. A fiber optic connector according to claim 16 wherein the end face defines a first lateral axis perpendicular to the longitudinal axis and a second lateral axis perpendicular to the longitudinal axis and to the first lateral axis and wherein the at least one second force centering element comprises a pair of second force centering elements spaced apart laterally in the direction of the first lateral axis and symmetrical about a plane comprising the first lateral axis and the longitudinal axis.

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21. A fiber optic connector comprising:

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a multifiber ferrule having an end face and an opposed rear face, the ferrule having a plurality of optical fiber bores extending therethrough for receiving the end portions of respective optical fibers adjacent the end face, the ferrule further having at least one guide pin hole for receiving a guide pin to align the multifiber ferrule with a mating multifiber ferrule, the guide pin hole defining an axis that is parallel to each of the optical fiber bores, the fiber optic connector defining a longitudinal axis that is generally parallel to the axis defined by the guide pin hole; and

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at least one force centering element for applying a resultant biasing force to the ferrule in the direction of the longitudinal axis such that the ferrule is not subjected to a moment about a lateral axis defined by the end face of the ferrule and generally perpendicular to the longitudinal axis.

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22. A fiber optic connector comprising:

a multifiber ferrule movably disposed within the fiber optic connector and having an end face, an opposed rear face and a plurality of optical fiber bores extending between the end face and the rear face, the optical fiber bores opening through the end face and the end face defining a plane that is generally perpendicular to each of the optical fiber bores; and

force centering means for exerting a biasing force on the ferrule such that the ferrule moves only in an axial direction that is parallel to each of the optical fiber bores and does not produce a moment about a lateral axis in the plane defined by the end face.

23. A fiber optic connector according to claim 22 wherein the force centering means comprises a coil spring and a spring seat disposed between the coil spring and the ferrule, the spring seat comprising a forward portion for engaging the rear face of the ferrule and a rearward portion opposite the forward portion.

24. A fiber optic connector according to claim 23 wherein the rearward portion of the spring seat comprises an outwardly extending protrusion that engages the coil spring and the forward portion of the spring seat transfers the biasing force from the coil spring to the ferrule.

25. A fiber optic connector according to claim 23 wherein the rearward portion of the spring seat engages the coil spring and the forward portion of the spring seat comprises an outwardly extending protrusion that engages the rear face of the ferrule and transfer the biasing force from the coil spring to the ferrule.

26. A fiber optic connector according to claim 23 wherein the rear face of the ferrule comprises at least one force centering element.

27. A fiber optic connector according to claim 23 wherein the forward portion of the spring seat comprises at least one force centering element and defines a convex surface in the direction of the lateral axis.

28. A fiber optic connector according to claim 23 wherein the ferrule comprises at least one first force centering element and defines a convex surface in the direction of a first lateral axis and the spring seat comprises at least one second force centering element and defines a convex surface in the direction of a second lateral axis.

29. A fiber optic connector according to claim 28 wherein the end face defines a first lateral axis perpendicular to the longitudinal axis and a second lateral axis perpendicular to the longitudinal axis and to the first lateral axis and wherein the at least one first force centering element comprises a pair of first force centering elements spaced apart laterally in the direction of the second lateral axis and symmetrical about a plane comprising the second lateral axis and the longitudinal axis.

30. A fiber optic connector according to claim 28 wherein the end face defines a first lateral axis perpendicular to the longitudinal axis and a second lateral axis perpendicular to the longitudinal axis and to the first lateral axis and wherein the at least one second force centering element comprises a pair of second force centering elements spaced apart laterally in the direction of the first lateral axis and symmetrical about a plane comprising the first lateral axis and the longitudinal axis.

31. A fiber optic connector comprising:  
a multifiber ferrule having an end face and an opposed rear face, the ferrule having a plurality of optical fiber bores extending therethrough and opening on the end face for receiving respective optical fibers therein, the fiber optic connector defining a longitudinal axis that is generally parallel to each of the optical fiber bores;  
a spring seat having a forward portion for engaging the rear face of the ferrule and a rearward portion opposite the forward portion;  
at least one first force centering element for applying a resultant biasing force in the direction of the longitudinal axis such that the ferrule is not subjected to a moment about a first lateral axis defined by the end face of the ferrule that is generally perpendicular to the longitudinal axis; and

at least one second force centering element for applying a resultant biasing force to the ferrule in the direction of the longitudinal axis such that the ferrule is not subjected to a moment about a second lateral axis defined by the end face of the ferrule that is generally perpendicular to the longitudinal axis and to the first lateral axis.

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32. A multifiber ferrule for a fiber optic connector, the ferrule comprising:  
a ferrule body extending between an end face and an opposed rear face, the ferrule body having a plurality of optical fiber bores opening through the end face, the end face defining a first lateral axis in a first direction and a second lateral axis in a second direction generally perpendicular to the first direction;

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wherein the rear face of the ferrule body comprises at least one force centering element for ensuring that a biasing force exerted on the ferrule does not subject the ferrule body to a moment about the first lateral axis and does not subject the ferrule body to a moment about the second lateral axis.

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33. A multifiber ferrule according to claim 32 wherein the at least one force centering element comprises an outwardly extending protrusion.

34. A multifiber ferrule according to claim 32 wherein the at least one force centering element comprises a first convex surface in the first direction.

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35. A multifiber ferrule according to claim 32 wherein the at least one force centering element comprises a second convex surface in the second direction.

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